
Accelerating business through next generation storage

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Legacy storage architectures have historically been costly and complex

- Frequent vendor induced upgrades
- A la carte software relicense required with each upgrade
- Data rigidly coupled to hardware
- Architectural limitations require overprovisioning to meet evolving SLAs
- Siloed from the broader enterprise ecosystem

We
know.

We partnered with
traditional storage providers
for years.



Storage Industry Trends ...

1. Budget constraints continue
2. Growth in unstructured data
3. Technology dramatically changing traditional storage architectures
4. Seeking to build upon virtualization for incremental efficiency
5. Need to leverage data to make better business decisions

**... creating opportunities
for innovation**



Dell embarked on a journey to create a new storage foundation based on...

Modern Storage Architectures

- Designed from the ground up to be flexible and agile
- Uncoupled from the limitations of any legacy architecture

Deep Integration

- Offering customers easy access to new, sophisticated technologies
- Deploying common technologies across a family of storage products

Design philosophy

- Easy to use
- Fully virtualized
- Intelligent tiering
- Highly Scalable
- No forklifts upgrades
- Innovative licensing

Dell Storage Strategy:

- 1 Harness state-of-the-art technologies to deliver innovative, simple and affordable solutions
- 2 Deliver workload-driven architectures that are flexible and modular
- 3 Accelerate software and service integration

Superior customer benefit

- Acquire, deploy, and grow on demand
- Adapt seamlessly to changing business needs
- Intelligently manage data assuring business continuity

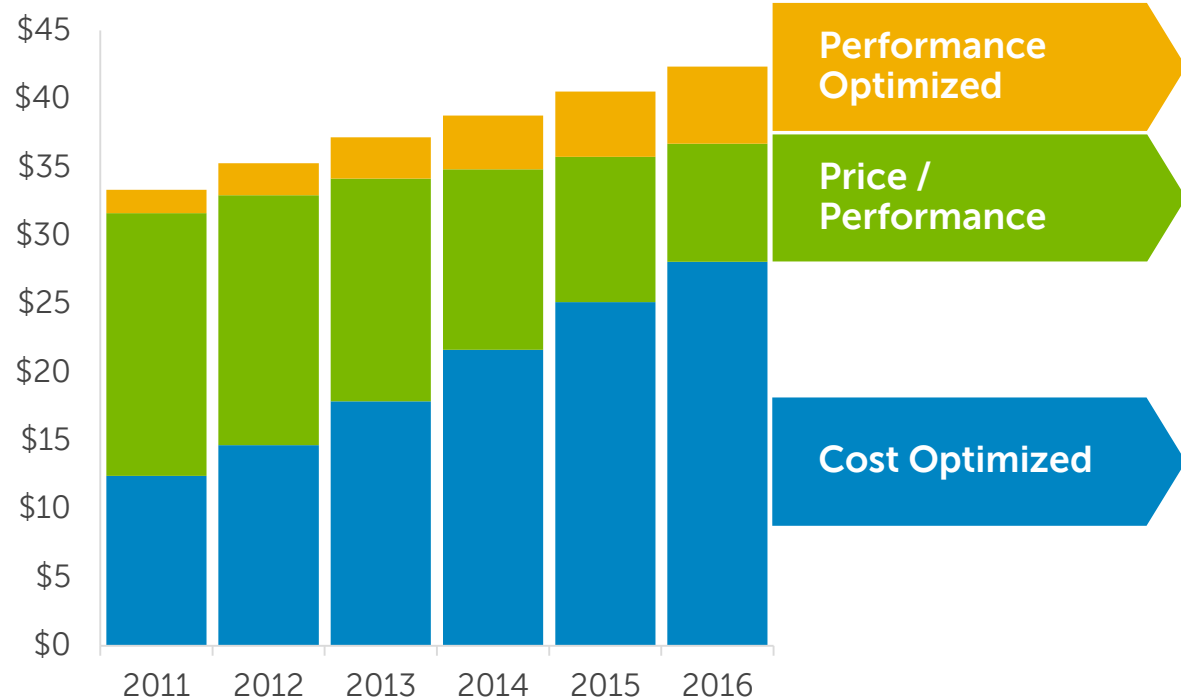
... redefining the economics
of enterprise storage



Harness
state-of-the-art
technologies
to deliver
innovative,
simple and
affordable
solutions

1

Industry storage trends are changing traditional storage architectures



Deliver
workload-
driven
architectures
that are
flexible
and modular

2

Right architecture for most important workloads



Big Data



VDI



Traditional IT



Cloud

Business Critical Workloads

- I/O intensive workloads
- Leverage flash storage
- Server-side cache
- Business critical

- Oracle
- SAP
- SQL Server

Collaboration and Infrastructure

- Optimized for virtualized environment
- Price/performance
- Traditional IT workloads

- Exchange, Lync
- SharePoint
- File, print, web
- VMware, Citrix, Hyper-V

Non-Mission Critical Workloads

- Focus on \$/TB
- Lowest TCO
- Dense enclosures
- Server-side storage

- Cold data archive
- Image archive
- Data dump

Accelerate software and service integration

3

Right technology for best innovation

Dell Gale
Next-generation
data center
automation

Dell Servers
Open, industry
standard
x86 technology

Dell Force 10
Data center
networking

Dell Exanet
Unified & Scalable
file system

Dell Compellent
Multi-protocol,
enterprise class

Hypervisors



Servers



Networking



Storage



Dell Enstratus
Leading
multi-cloud
management
software

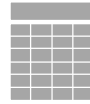
Dell RNA
Virtual cache
pools

Dell AppAssure
Ensuring
business continuity

Ocarina
Dedup and
Compression

Dell EqualLogic
Virtualized
Storage

Delivering new workload-driven architectures that simplify IT



Big Data



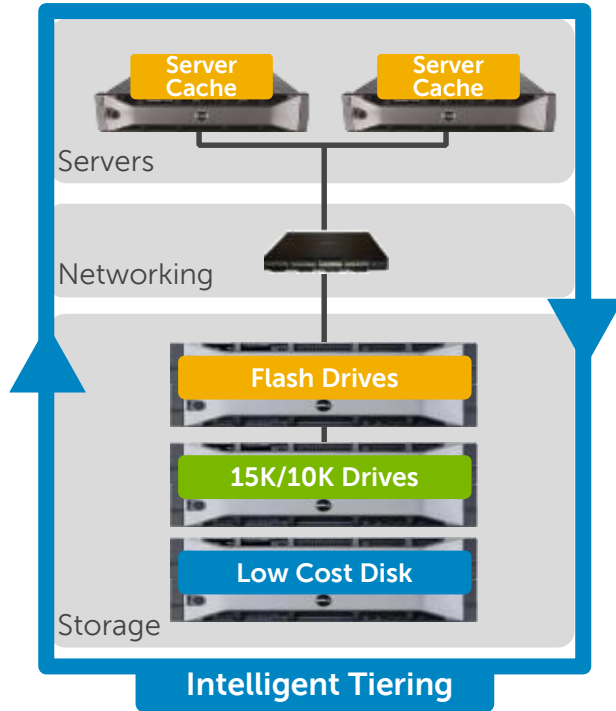
VDI



Traditional IT



Cloud



Performance Optimized

- I/O intensive workloads
- Leverage flash storage
- Server-side cache
- Business critical

Business Critical Workloads

- Oracle
- SAP
- SQL Server

Price Performance

- Optimized for virtualized environment
- Price/performance
- Traditional IT workloads

Collaboration and Infrastructure

- Exchange, Lync
- SharePoint
- File, print, web
- VMware, Citrix, Hyper-V

Cost Optimized

- Focus on \$/TB
- Lowest TCO
- Dense enclosures
- Server-side storage

Non-Mission Critical Workloads

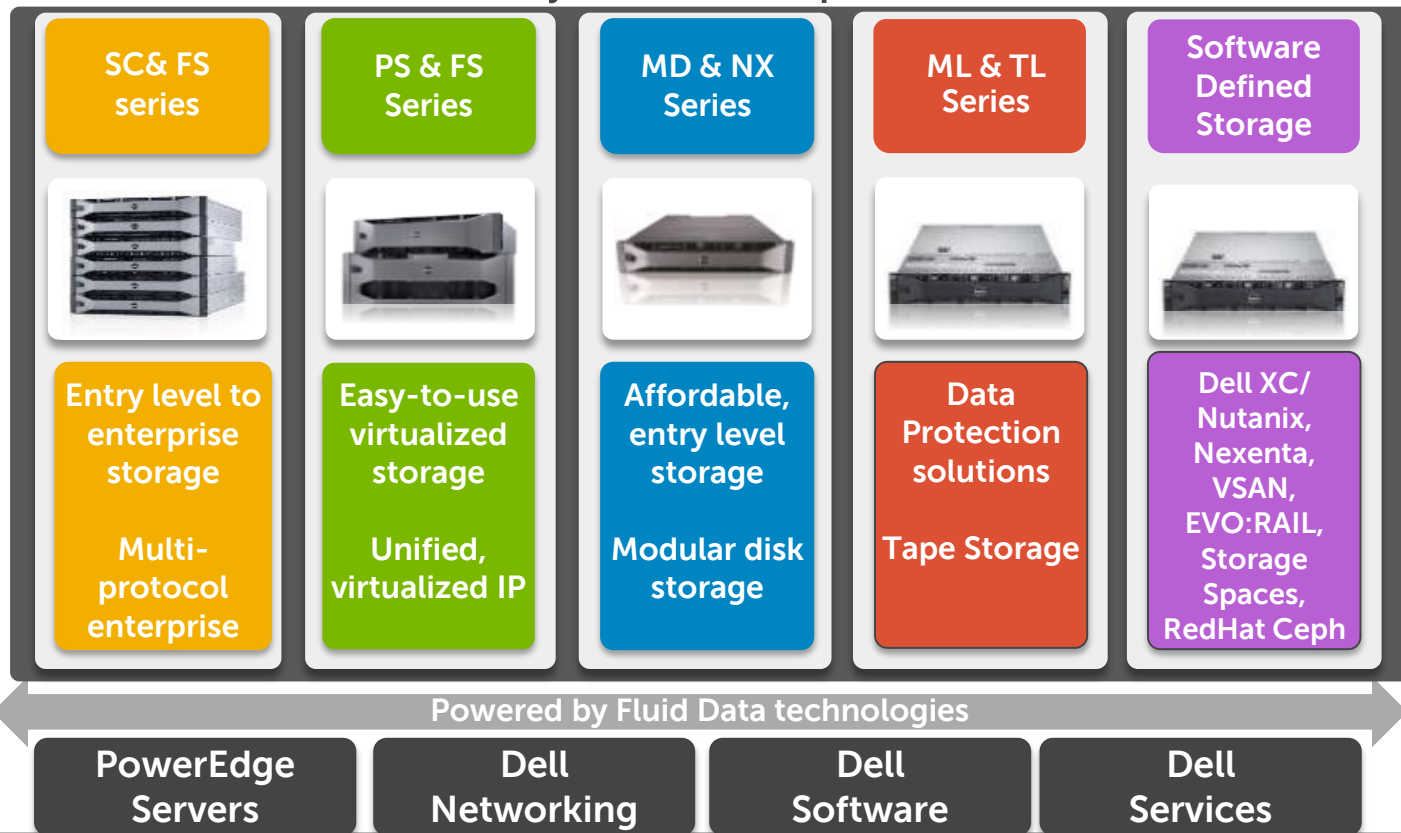
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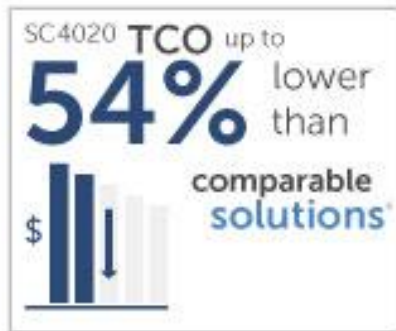
The Dell Storage Portfolio

Workload-optimized solutions for any size enterprise

Workload-
optimized
solutions
for any
size
enterprise



Innovation redefines storage economics



¹ #1 supplier of total storage (internal and external) worldwide in the first three quarters of 2014 based on total terabytes sold per IDC Worldwide Disk Storage Systems Tracker Q3 2014, using terabyte share data, excluding ODM.

² #1 iSCSI storage vendor worldwide by revenue and market share for 26 out of 27 quarters (2008Q1-2014Q3) per the IDC Worldwide Quarterly Disk Storage Systems Tracker, Q3 2014.

³ #1 external DAS vendor by vendor revenue share worldwide for the past seven quarters (2013Q1-2014Q3) per the IDC Worldwide Quarterly Disk Storage Systems Tracker, Q3 2014.

⁴ Based on Dell analysis of competitive US list pricing from Gartner Inc., CP Storage, as May 27, 2014. Geographic limitations on comparative advertising may apply.

⁵ IT Brand Pulse Annual Brand Survey, August 2014.

⁶ ESG Lab September 2014 White Paper, "Dell Storage SC4020 TCO Analysis," contrasting SC4020 costs over 8 years with comparable solutions from two leading vendors.

⁷ Results based on internal Dell analysis of online surveys, FY 2009-2014.

⁸ 9th annual Storage magazine/SearchStorage.com Quality Awards for Midrange Arrays (Sept. 2014).

⁹ Dell Storage ranked #1 in storage value based on Storage Wave 17 report by analyst firm InfoPro (part of 451 Research), March 2014.

¹⁰ *Referring to Dell XC Series Appliances based on the "Dell and Nutanix Introduce a Converged VDI Application Appliance," Dell-sponsored paper by David Floyer, November 17, 2014.



Dell Storage SC and FS series

Dynamically unifying your data center

NEW

SC8000

Storage Center
Controller



- Intelligent self-optimizing design featuring Compellent Data Progression technology

SC4020

"All-in-one" array



- Enterprise advantage for mid-size deployments
- "All-in-one" chassis (dual controllers + 24 drive slots) with optional expansion to 192 drives.

SCv2000

Storage Center
Controller



- Intelligent arrays offering superior performance for entry-level storage
- Common Storage Center management, remote and local data protection.

SC200/SC220

enclosure



- **SC220:** 2U, 6Gb SAS expansion enclosure that supports up to 24x 2.5" drives
- **SC200:** 2U, 6Gb SAS expansion enclosure supporting up to 12x 3.5" drives

SC280

dense enclosure



- 5U expansion enclosure supports up to 84x 6TB drives
- Up to 100TB of raw capacity per RU
- Up to 4PB raw capacity per 48U rack (w/two Storage Center systems)

Flash-optimized solutions



- The new \$25K All-Flash array
- Both SC8000 and SC4020 support all-flash or hybrid
- Unique ability to tier between write- and read-intensive SSDs

**FS8600 with
Fluid File v4**
Scale-out NAS
unified storage



- Scale-out file architecture
- High performance and availability
- Policy-driven dedupe and compression
- Single namespace up to 4PB

Dell Storage SCv2000 features

New models:

- SCv2000 – 2U, 12 HDDs
- SCv2020 – 2U, 24 HDDs
- SCv2080 – 5U, 84 HDDs
- Expansion enclosures – SC100, SC120, SC180

Common **Storage Center** features:

- Thin Provisioning
- Virtual Ports
- Dynamic Controllers
- Enterprise Manager

Flexible **options**:

- Various mix of HDDs and SSDs
- Connectivity options (FC, iSCSI, SAS and multi-protocol)
- Data protection with Remote DP, Local DP and Replay Manager

Newest member of award-winning Dell SC series



Easily expands into enterprise-level Dell storage with one-time hardware migration to SC4020 or SC8000*

*hardware migration involves additional expense

SC Series: Intelligent storage for any environment

Shared attributes

- Self-optimizing efficiency
- Virtualized architecture
- Broad integrations
- End-to-end management

Single-tier optimization

Better value than competing entry-level arrays

SCv2000



Intelligent entry-level solutions

Multi-tier optimization

+ Enhanced

- ✓ Performance
- ✓ Efficiency
- ✓ Investment protection

SC4000



Enterprise advantage for mid-size deployments

+ Highest

- ✓ Performance
- ✓ Capacity
- ✓ Flexibility

SC8000



Flagship Dell solution for the largest storage environments

SC Series now supports **FOUR** array categories

Flash-Optimized

Multi-tier flash, leverages WL and RI SSDs

New!

Entry-Level Flash

Single-tier, economical RI SSDs

Hybrid (#1 customer choice)

"Best of all worlds," tiered SSD and HDD

Traditional HDD arrays

Cost-optimized solutions for bulk storage

Industry's lowest-priced all-flash array!



- (6) 480GB RI SSDs, 2.8TB raw capacity
- Dramatic IOPs speed boost over HDD
- Evolve to Flash-Optimized or Hybrid solution

All-flash or Hybrid arrays evolve with your needs

Entry-Level Flash

Flash-Optimized

Faster
writes!

All-flash

Start small



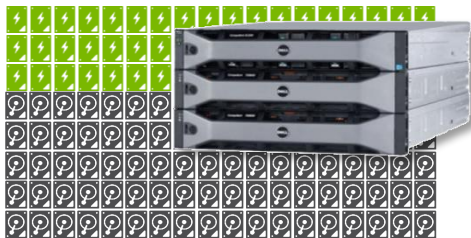
All-flash

Add more SSDs



Hybrid

*Add HDD tier
for additional
cost savings*



= WI SSD



= RI SSD



= HDD



Now 3 classes of SSDs in SC portfolio

Solid-state drives

Write-intensive

- 200 GB
- 400 GB
- 800 GB
- 1.6 TB

Premium Read-intensive

- 480 GB
- 960 GB
- 1.6 TB
- 1.9 TB

Mainstream Read-intensive

- 480 GB
- 960 GB
- 1.9 TB
- 3.8 TB

New

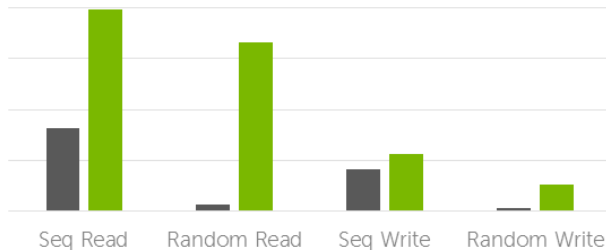
Spinning disk

SAS

- 300 GB (15K)
- 450 GB (15K)
- 600 GB (15K)
- 1 TB (7K)
- 1.2 TB (10K)
- 2 TB (7K)
- 3 TB (7K)
- 4 TB (7K)
- 6 TB (7K)

New technology benefits multiple SC array categories

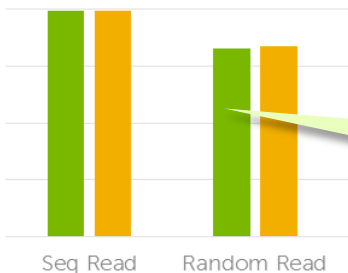
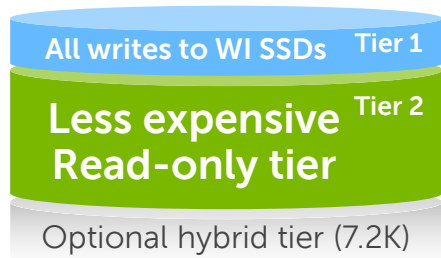
Crank up the speed of general-purpose arrays



Up to **24x** more
IOPs @ same cost

- ✓ Lower latency
- ✓ Lower power/ cooling
- ✓ Smaller footprint

Reduce the cost of premium performance “flash-optimized” arrays



50% lower \$/GB (Tier 2)

No read performance
reduction vs. other RI SSDs

■ 15K HDD ■ Mainstream RI SSD (TLC) ■ Premium RI SSD ■ WI SSD



Dell Storage PS Series and scale-out file

Uncomplicated, versatile, virtualized iSCSI storage

NEW

PS-M4110

Blade Arrays

One streamlined data center



- Converged storage, servers and networking
- Ideal for general purpose SMB workloads

PS4100

Entry-level, advanced functionality



- Pay as you grow scalability
- Ideal for small and remote offices

PS4210

Performance and simplicity for SMB



- Next-generation 10GbE arrays for SMB
- Hybrid arrays for VDI and critical data

PS6100

Performance for business responsiveness



- Scale capacity and performance
- Hybrid SAN for VDI deployments

PS6210

Performance and efficiency simplified for the real world



- High performance for critical workloads
- Next-generation 10GbE arrays with All Flash and Hybrid SAN

PS6500/6510

Powerful. Virtual. Data center.



- Enterprise scalability: up to 2.3PB
- Ideal for heavy sequential workloads

PS6610

High capacity, enterprise storage



- High capacity, ultra-dense storage
- Ideal for high-performance data backup workloads

FS7600/7610

Scale-out NAS unified storage with Fluid File v4



- File dedupe and compression
- Single interface to manage file and block data

Introducing the Dell Storage PS6610 Series



Up to **3.5X** capacity

compared to previous arrays

Up to
98,000 IOPS*

Random read performance

Next generation arrays for high capacity deployments

- Increased performance up to 7X the previous generation
- Scale out to up to 504TB capacity per array
- Up to 50% space savings with compression of snapshots and replicas

* Based on January 2015 Dell performance testing the PS6610ES hybrid-flash arrays using IOMeter with 4KB block and 100% random read IOs.
Actual performance will vary depending on the workload and drive type.

Storage Marketing



New Dell EqualLogic PS Series Array Software 8.0

Compression



Reduces snapshot consumption in the PS series

Dense Hardware



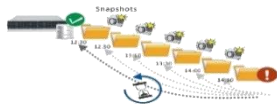
New dense PS series models supporting compression software

VVol Support



Provides object based mapping of virtual machines to storage resources

Default Daily Snapshots



Global, daily snapshot schedule that is executed on unprotected volumes

Space Borrowing



Enables the user to better utilize their storage by enabling volume snapshots to borrow from replica reserve

Smart Tags



Ability to allow a storage manager to "tag" volume objects in the storage group with a user supplied or application-generated string

Let's get started



Visit dell.com/storage





The power to do more